

WHAT IS CLAIMED IS:

1. An assisting apparatus for using power from a moving member to assist the operation of a bicycle transmission comprising:

a power transfer mechanism, wherein the power transfer mechanism moves in one of a first direction and a second direction to upshift the bicycle transmission, and wherein the power transfer mechanism moves in the other one of the first direction and the second direction to downshift the bicycle transmission;

a drive coupling mechanism that moves toward the moving member to couple the power transfer mechanism to the moving member to move the power transfer mechanism in one of the first direction and the second direction; and

a position maintaining mechanism that prevents the power transfer mechanism from moving in the other one of the first direction and the second direction.

2. The apparatus according to claim 1 wherein the drive coupling mechanism comprises a first moving member engaging member that moves between a first moving member engaging position and a first moving member disengaging position.

3. The apparatus according to claim 2 wherein the drive coupling mechanism further comprises a moving member engaging member retaining mechanism that retains the first moving member engaging member in the first moving member disengaging position.

4. The apparatus according to claim 3 wherein the moving member engaging member retaining mechanism comprises a movable moving member engaging member retainer.

5. The apparatus according to claim 3 wherein the moving member engaging member retaining mechanism comprises a fixed moving member engaging member retainer.

6. The apparatus according to claim 3 wherein the drive coupling mechanism further comprises a moving member engaging member releasing mechanism that allows the first moving

member engaging member to move from the first moving member disengaging position toward the first moving member engaging position.

7. The apparatus according to claim 6 wherein the drive coupling mechanism further comprises a moving member engaging member reset mechanism that resets the first moving member engaging member into the first moving member disengaging position.

8. The apparatus according to claim 6 wherein the moving member engaging member retaining mechanism comprises:

a movable moving member engaging member retainer;

a fixed moving member engaging member retainer; and

wherein the first moving member engaging member engages one of the movable moving member engaging member retainer and the fixed moving member engaging member retainer when the first moving member engaging member is in the first moving member disengaging position.

9. The apparatus according to claim 8 wherein the drive coupling mechanism comprises a second moving member engaging member that moves between a second moving member engaging position and a second moving member disengaging position.

10. The apparatus according to claim 9 wherein the first moving member engaging member engages one of the movable moving member engaging member retainer and the fixed moving member engaging member retainer when the first moving member engaging member is in the first moving member disengaging position, and wherein the second moving member engaging member engages the other one of the movable moving member engaging member retainer and the fixed moving member engaging member retainer when the second moving member engaging member is in the second moving member disengaging position.

11. The apparatus according to claim 10 wherein movement of the movable moving member engaging member retainer allows the one of the first moving member engaging member and the second moving member engaging member that engages it to move toward the

corresponding first moving member engaging position and second moving member engaging position.

12. The apparatus according to claim 1 wherein the position maintaining mechanism comprises a first position maintaining member that moves between a first position maintaining position and a first position releasing position.

13. The apparatus according to claim 12 wherein the first position maintaining member engages a fixed member when the first position maintaining member is in the first position maintaining position to prevent movement of the power transfer mechanism.

14. The apparatus according to claim 13 further comprising a position releasing mechanism that disengages the first position maintaining member from the fixed member to allow movement of the power transfer mechanism.

15. The apparatus according to claim 14 wherein the position releasing mechanism further comprises an intermediate position maintaining mechanism that maintains the first position maintaining member in an intermediate position when the first position maintaining member is disengaged from the fixed member.

16. The apparatus according to claim 15 wherein the intermediate position maintaining mechanism comprises:

an intermediate position maintaining member supported to the first position maintaining member; and

an intermediate position maintaining abutment that engages the intermediate position maintaining member to prevent movement of the power transfer mechanism.

17. The apparatus according to claim 16 wherein the position releasing mechanism further comprises a release moving member engaging member structured to engage the moving member, wherein the intermediate position maintaining member disengages from the

intermediate position maintaining abutment when the release moving member engaging member engages the moving member.

18. The apparatus according to claim 1 wherein the power transfer mechanism rotates around a power transfer axis, wherein the drive coupling mechanism is coupled to the power transfer mechanism for rotation around the power transfer axis, and wherein the position maintaining mechanism is coupled to the power transfer mechanism for rotation around the power transfer axis.

19. The apparatus according to claim 18 further comprising a fixed member adapted to be fixed relative to a frame of a bicycle.

20. The apparatus according to claim 19 wherein the drive coupling mechanism engages the moving member at a radially inward location of the power transfer mechanism, and wherein the position maintaining mechanism engages the fixed member at a radially outward location of the power transfer mechanism.

21. An assisting apparatus for using power from a rotating member to assist the operation of a bicycle transmission comprising:

a power transfer mechanism, wherein the power transfer mechanism rotates in one of a clockwise direction and a counterclockwise direction to upshift the bicycle transmission, and wherein the power transfer mechanism rotates in the other one of the clockwise and the counterclockwise direction to downshift the bicycle transmission;

a drive coupling mechanism that couples the power transfer mechanism to the rotating member to rotate the power transfer mechanism in one of the clockwise direction and the counterclockwise direction, wherein the drive coupling mechanism comprises:

a first moving member engaging member that moves between a first moving member engaging position and a first moving member disengaging position;

a moving member engaging member retaining mechanism that retains the first moving member engaging member in the first moving member disengaging position;

a moving member engaging member releasing mechanism that allows the first moving member engaging member to move from the first moving member disengaging position toward the first moving member engaging position; and

a moving member engaging member reset mechanism that resets the first moving member engaging member into the first moving member disengaging position;

a position maintaining mechanism that prevents the power transfer mechanism from rotating in the other one of the clockwise direction and the counterclockwise direction, wherein the position maintaining mechanism comprises a first position maintaining member that moves between a first position maintaining position and a first position releasing position, wherein the first position maintaining member engages a fixed member when the first position maintaining member is in the first position maintaining position to prevent rotation of the power transfer mechanism; and

a position maintaining member releasing mechanism that disengages the first position maintaining member from the fixed member to allow rotation of the power transfer mechanism.

22. The apparatus according to claim 21 wherein the drive coupling mechanism further comprises a second moving member engaging member that moves between a second moving member engaging position and a second moving member disengaging position, wherein the moving member engaging member retaining mechanism retains the second moving member engaging member in the second moving member disengaging position, and wherein the moving member engaging member releasing mechanism allows the second moving member engaging member to move toward the second moving member engaging position.

23. The apparatus according to claim 22 wherein the moving member engaging member retaining mechanism comprises:

a movable moving member engaging member retainer;

a fixed moving member engaging member retainer;

wherein the first moving member engaging member engages one of the movable moving member engaging member retainer and the fixed moving member engaging member retainer when the first moving member engaging member is in the first moving member disengaging

position; and

wherein the second moving member engaging member engages the other one of the movable moving member engaging member retainer and the fixed moving member engaging member retainer when the second moving member engaging member is in the second moving member disengaging position.

24. The apparatus according to claim 23 wherein the moving member engaging member releasing mechanism comprises the movable moving member engaging member retainer, wherein movement of the movable moving member engaging member retainer allows the one of the first moving member engaging member and the second moving member engaging member that engages it to move toward the corresponding first moving member engaging position and second moving member engaging position.

25. The apparatus according to claim 24 wherein the movable moving member engaging member retainer comprises a retaining abutment that maintains the one of the first moving member engaging member and the second moving member engaging member that engages it in the corresponding moving member disengaging position.

26. The apparatus according to claim 25 wherein movement of the movable moving member engaging member retainer disengages the abutment from the one of the first moving member engaging member and the second moving member engaging member that engages it.

27. An assisting apparatus for using power from a moving member to assist the operation of a bicycle transmission comprising:

a power transfer mechanism, wherein the power transfer mechanism moves in one of a first direction and a second direction to upshift the bicycle transmission, and wherein the power transfer mechanism moves in the other one of the first direction and the second direction to downshift the bicycle transmission;

a drive coupling mechanism that couples the power transfer mechanism to the moving member to move the power transfer mechanism in the one of the first direction and the second direction, wherein the drive coupling mechanism comprises:

a first moving member engaging member that moves between a first moving member engaging position and a first moving member disengaging position;

a moving member engaging member retaining mechanism that retains the first moving member engaging member in the first moving member disengaging position;

a moving member engaging member releasing mechanism that allows the first moving member engaging member to move from the first moving member disengaging position toward the first moving member engaging position; and

a moving member engaging member reset mechanism that resets the first moving member engaging member into the first moving member disengaging position;

a position maintaining mechanism that prevents the power transfer mechanism from moving in the other one of the first direction and the second direction, wherein the position maintaining mechanism comprises a first position maintaining member that moves between a first position maintaining position and a first position releasing position, wherein the first position maintaining member engages a fixed member when the first position maintaining member is in the first position maintaining position to prevent movement of the power transfer mechanism;

an overshift mechanism that allows the power transfer mechanism to move temporarily beyond a position corresponding to where the position maintaining mechanism ordinarily engages the fixed member to prevent movement of the power transfer mechanism; and

a position maintaining member releasing mechanism that disengages the first position maintaining member from the fixed member to allow movement of the power transfer mechanism.

28. The apparatus according to claim 27 wherein the overshift mechanism comprises a resilient member.

29. The apparatus according to claim 27 wherein the overshift mechanism forms a part of the moving member engaging member reset mechanism.

30. The apparatus according to claim 29 wherein the moving member engaging member

reset mechanism comprises:

a decoupling ramp that causes the first moving member engaging member to move to the first moving member disengaging position; and

a decoupling wall that retains the first moving member engaging member in the first moving member disengaging position.

31. The apparatus according to claim 30 wherein the decoupling ramp comprises a resilient member.

32. The apparatus according to claim 31 wherein the decoupling ramp comprises a leaf spring.

33. The apparatus according to claim 30 wherein a surface of the decoupling ramp faces a first surface of the decoupling wall.

34. The apparatus according to claim 33 wherein the first moving member engaging member moves between the surface of the decoupling ramp and the first surface of the decoupling wall and is retained in the first moving member disengaging position at a second surface of the decoupling wall that is opposite the first surface of the decoupling wall.

35. The apparatus according to claim 34 wherein the decoupling ramp comprises a leaf spring.

36. An assisting apparatus for using power from a moving member to assist the operation of a bicycle transmission comprising:

a power transfer mechanism, wherein the power transfer mechanism moves in one of a first direction and a second direction to upshift the bicycle transmission, and wherein the power transfer mechanism moves in the other one of the first direction and the second direction to downshift the bicycle transmission;



a drive coupling mechanism that couples the power transfer mechanism to the moving member to move the power transfer mechanism in one of the first direction and the second direction;

a position maintaining mechanism that prevents the power transfer mechanism from moving in the other one of the first direction and the second direction; and

wherein the drive coupling mechanism and the position maintaining mechanism together comprise:

a mounting member;

a moving member engaging member coupled to the mounting member, wherein the moving member engaging member moves between a first moving member engaging position and a first moving member disengaging position;

a position maintaining member coupled to the mounting member, wherein the position maintaining member moves between a first position maintaining position and a first position releasing position; and

wherein the mounting member, the moving member engaging member and the position maintaining member are coupled together so that the mounting member, the moving member engaging member and the position maintaining member may be removed as a unit from the assisting apparatus.